

# LISTing Newsletter

Newseltr of the Long Island Sinclair/TimeX Users Group  
(Incorporating N.Y.T.S.E.)

MARCH 1992

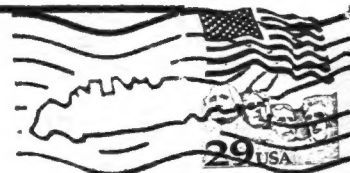


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LIST  
5 Peri Lane  
Valley Stream, NY 11581



TO:

I.S.T.U.G.  
513 EAST MAIN STREET  
PERU IN 46970

## FIRST CLASS MAIL Dated Meeting Notice

March 1992

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SUN	MON	TUE	WED	THU	FRI	SAT
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

DONT FORGET L. I. S. T. MEETING at  
2pm, SUNDAY, March, 8

# LIST OFFICERS

\*\*\*\*\*  
 PRES. HARVEY RAIT  
 TRES. ROBERT MALLOY  
 COR. SEC. JOHN PAZMINO  
 EDITOR. FRED STERN  
 LIBR. TOM SKAPINSKI  
 \*\*\*\*\*

PLEASE SEND INQUIRIES TO:  
 LIST  
 MR. HARVEY RAIT  
 5 PERI LANE  
 VALLEY STREAM, N.Y. 11581

PLEASE SEND SUBMISSIONS TO:  
 LISTING  
 MR. FREDERIC STERN  
 214 ROBERTS ST.  
 HOLBROOK, N.Y. 11741  
 \*\*\*\*\*

## NYTSE

\*\*\*\*\*  
 NYTSE MEETS ON MONDAY THE WEEK  
 AFTER THE LIST MEETING AT:  
 MISS KIMS RESTAURANT  
 PARK AVENUE SOUTH  
 BETWEEN 21 ST. AND 22 ST.  
 MEETINGS START 7:30 PM.

## COMING EVENTS:

\*\*\*\*\*  
 MAR. 8, 1992 LIST MEETING.  
 MAR. 16, 1992 NYTSE MEETING

## MEETING MINUTES

REPORTED BY:  
 MICHAEL STERN  
 FEB. 9, 1992.  
 \*\*\*\*\*  
 HARVEY CALLED THE MEETING TO  
 ORDER AT 2:30PM.

THE FEBRUARY NEWSLETTER WAS NOT  
 RECEIVED BY TOM SKAPINSKI FOR  
 PRINTING. BOB MALLOY SUGGEST  
 THAT WE COMPOSE THE NEWSLETTER  
 AT THE END OF THE MEETING.  
 ALSO SUGGESTED WAS TO PUT INTO  
 THE NEWSLETTER A CALENDER,  
 SHOWING THE DAY, DATE, AND TIME  
 OF THE UP COMING MEETINGS.

HARVEY READ THREE LETTERS FROM  
 PEOPLE ASKING FOR INFORMATION  
 FROM L.I.S.T.. JOHN PAZMINO WILL  
 ANSWER ONE OF THE LETTERS, AND  
 FRED STERN WILL ANSWER THE OTHER  
 TWO.

BOB GILDER INFORMED US THAT HIS  
 94 YEAR OLD FATHER IS IN THE  
 HOSPITAL RECOVERING FROM AN  
 ILLNESS. WE ALL WISH HIM A  
 SPEEDY RECOVERY.

BOB GILDER GAVE A DEMONSTRATION  
 OF THE QL EPROM BURNER ACCESSORY  
 AND DUPLICATED A FEW EPROMS FOR  
 FRED. LIKE OTHER TIMEX EQUIPMENT  
 THIS ONE IS VERY VERSITIAL. BOB  
 SHOWED HOW THE EPROM DATA CAN BE  
 READ AND VERIFIED ON THE HOST  
 EPROM, THEN THE DATA IS TRANS-  
 FERED INTO MEMORY. A FRESH EPROM  
 IS PLACED INTO THE ZIP SOCKET,  
 THEN THE INFORMATION FROM MEMORY  
 IS BURNED INTO IT.

FINALLY, FRED TOLD US OF A NEW  
 NEWSLETTER FROM CANADA CALLED  
 ZX-91. SEE THE ZX-81/TS1000  
 COLUMN ON PAGE 8 FOR MORE  
 DETAILS

SWAP MEET NEWS  
 \*\*\*\*\*

BEFORE AND AFTER THE MEETING,  
 L.I.S.T. HELD ITS SEMI-ANNUAL  
 SWAPMEET.

JOHN PAZMINO WAS SELLING GOODIES  
 FOR THE TS1000, TS2068 AND QL.

MICHAEL STERN (FREDS SON) WAS  
 SELLING TS1000 PERIPHERALS.

STONEY M. WAS SELLING COMPUTER  
 PERIPHERALS AND NINTENDO GAME  
 CARTRIDGES.

BARGAINS AND FUN WERE HAD BY ALL

LIST PUBLICATIONS  
 \*\*\*\*\*

THE FOLLOWING ARE AVAILABLE  
 THROUGH LIST:

ZX-81/TS1000 TECHNICAL  
 TIDBITS

TECHNICAL TIDBITS PART II

SAVINGS AND LOAD OF THE TIMEX  
 COMPUTER

\$4.00 EACH.

## CLASSIFIEDS

\*\*\*\*\*  
 THIS CLASSIFIED SECTION IS  
 AVAILABLE TO ALL LIST MEMBERS  
 FREE OF CHARGE.  
 THE ONLY RESTRICTION IS THAT  
 IT IS TO BE USED ONLY FOR THE  
 SEEKING, SELLING OR SWAPPING  
 OF SINCLAIR, TIMEX OR MICROACE  
 COMPUTER EQUIPMENT, PERIPHERALS  
 AND SOFTWARE.  
 LISTING, LIST, AND ITS OFFICERS  
 DO NOT ENDORSE, WARRANTY, OR  
 GUARANTEE ANY OF THE ITEMS  
 LISTED IN THIS CLASSIFIED  
 SECTION

\*\*\*\*\*  
 I AM LOOKING FOR A DISK DRIVE  
 CASE, FOR FULL HEIGHTDRIVES.  
 FRED STERN 516-737-0963.

IRISH PCC-10 BLANK TAPES AT AN  
 INCREDIBLY LOW PRICE. CALL TOM  
 516-732-1825.

Continued on P8



## LIST TAPE LISTINGS

The following is a listing of the programs on LIST tape #9. These are all 2068 programs. To get this tape or any of the other LIST tapes, send \$6.00, OR a QUALITY 60 minute tape and \$3.00 to Harvey Rait, at the address in the box on the first page. Better yet, come to the meetings and pay only \$1.50 per tape (call or write Harvey first so he can have the tape(s) ready).



- 1 Wrapping
- 2 PRCODE
- 3 WORD PROCS
- 4 AERCO INT
- 5 TALK CLOCK
- 6 ZTALK
- 7 INVOICING
- 8 BIORHYTHMS
- 9 READER 1
- 10 READER 2
- 11 TRACE
- 12 RENUMBER
- 13 CASE SWAP
- 14 VARS
- 15 SCROLL
- 16 SCROLL
- 17 SCROLL
- 18 OVERS 1
- 19 OVERS 2
- 20 PATTERNS 1
- 21 PATTERNS 2
- 22 PAINTING
- 23 PICTURE
- 24 FLAG
- 25 FILE
- 26 ANDROIDS
- 27 B & C
- 28 SIMON SAYS
- 29 FINAL
- 30 TEST
- 31 SECONDS
- 32 NAVIGATION
- 33 SQ ROOT
- 34 UP & DOWN
- 35 DIG. TIMER
- 36 PAPER & INK
- 37 BEWARE DOG
- 38 EXAM
- 39 KEYBOARD M
- 40 LAS VEGAS

- 41 PARROT
- 42 KENTACKY
- 43 STM
- 44 MC EXAMPLE
- 45 SHAKESPEARE
- 46 TRESURE H
- 47 I.T. ONE
- 48 THE I.T.
- 49 WOLF & GOATS
- 50 RACER
- 51 AT MARKET
- 52 WINDOWS
- 53 STICKS
- 54 NEW CHR\$
- 55 NEW CHR\$
- 56 NEW CHR\$
- 57 NEW CHR\$
- 58 MESSAGE
- 59 TITLEMAKER
- 60 REGRESSION
- 61 BAR GRAPH
- 62 SCROLL\$
- 63 AUTUMN
- 64 NO. SORT
- 65 WORD SORT
- 66 DERBY DAY
- 67 ATTR TABLE
- 68 METRIC
- 69 HEADER
- 70 HEADER/C
- 71 SEARCH
- 72 S/DATA
- 73 DEMOLITION

SIDE B

- 1 DEMOLITION
- 2 DEMOLITION
- 3 SUBMARINE
- 4 BRICKS
- 5 MONEYPAIL
- 6 CHOMPER

- 7 ASTEROIDS
- 8 TREE MAKER
- 9 MOZART WA
- 10 SANTA WA86
- 11 LOANS WA86
- 12 E Z DIS
- 13 UDG DESIGN
- 14 NETWORK
- 15 128 COLORS
- 16 BANANAS
- 17 M/C LOADER
- 18 PSGE 32/64
- 19 MMI
- 20 CHARACTERS
- 21 FULLGIRLS
- 22 JANIS
- 23 CONVERSION
- 24 TIMER 1C
- 25 TITLE/CODE
- 26 BBS
- 27 ATTR
- 28 2XSIZEHITE
- 29 3 CHARS
- 30 TITL/SHOOT
- 31 TITL/SHOOT
- 32 PAINTSIC
- 33 SANTA
- 34 SCRAMBLER
- 35 TAPE/ANALY
- 36 MULTIFILE
- 37 SAVER
- 38 SAVER MC
- 39 TASPRINT
- 40 TASFONT 0
- 41 TASPRINT
- 42 TAS2PRINT
- 43 TAS2PRINT
- 44 TASPRINT
- 45 COMMENTS



## 'HACKER' BITES THE DUST AND BIDS FAREWELL TO ITS READERS.

In a last minute attempt to keep the "HACKER" afloat, the editor has decided that the ole "HACKER" has finally seen its better days. This was a hard decision to make, but with the cost of postage, printing and other factors involved, the newsletter can not keep its head above water.

Lack of renewals and input were the major factors. I'm not pointing a finger at any one factor. It's just very hard to operate a newsletter devoted to one type of computer when bigger, faster and more compatible machines are looming over your shoulders. Like I stated many times before, "How can one editor write about the groups efforts when only one member still owns a TIMEX?" Our membership has dropped within the last year to only four and our circulation of the HACKER has declined to six paid members out of 34 mailings. I'm not blaming anyone. I knew this was going to happen. I'm surprised that I lasted five years as editor.

All in all, I enjoyed all the other newsletters that were exchanged. I hope that the other editors keeping on producing those fine issues.

On behalf of the last remaining members Ralph Hammer, Chris Fenn and our founding forefather John Sumpolec, we wish all of you good luck in the future. This will be the last issue printed and mailed. If you wish to extract our name from your mailing list, feel free to do so.

It's been fun and informative. I wish all of you the best of luck.

**FAREWELL READERS.....**



## System Laws & Rules

Information necessitating a change in the system will be conveyed to the designer after, and only after, the plans have been finished.

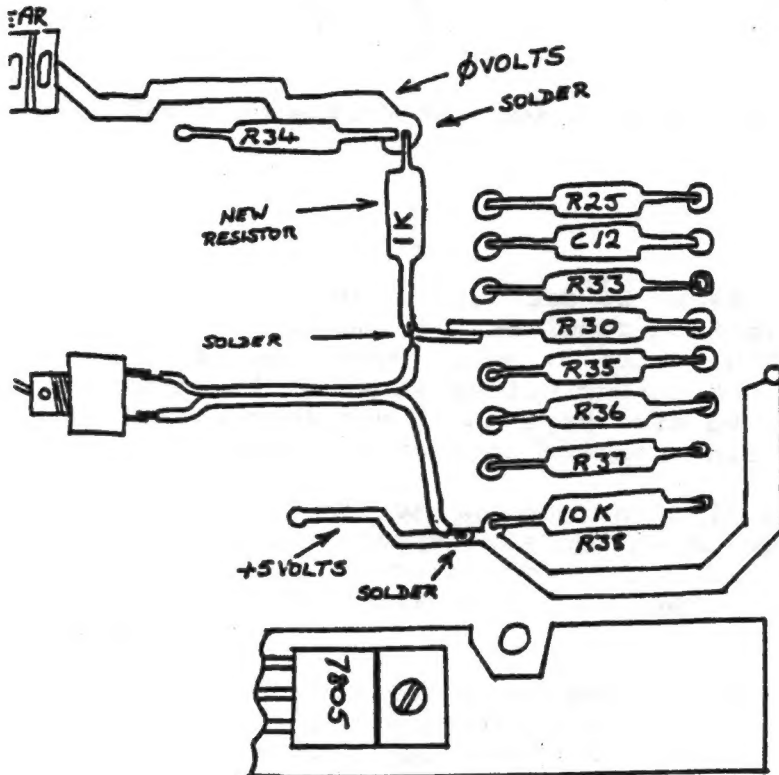
Contracts and warranties are void upon payment of invoice.

The value of any program is proportional to the weight of its output.

the value of any program is inversely proportional to its cost.

SUBMITTED by ANTHONY W. FARRELL  
1/25 NEWPORT ROAD  
SOUTH CLAYTON, VIC 3169

# TS1000 TURBO

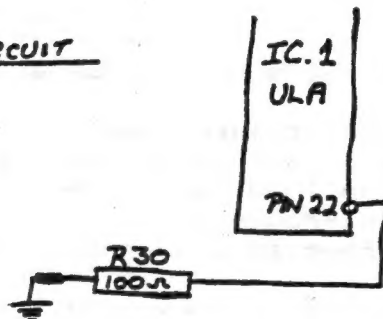


## PARTS REQUIRED.

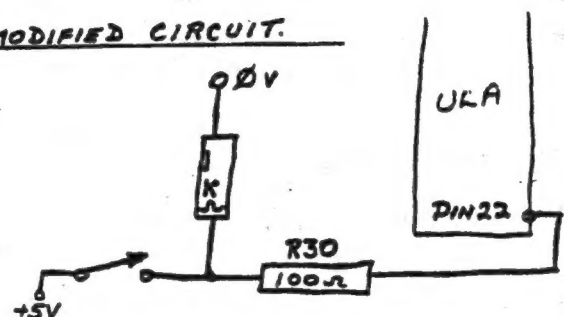
- 1 x SP/ST SWITCH
- 1 x 1K 1/4W RESISTOR
- 1 x RIBBON CABLE (6" LONG)

## TURBO/NORMAL SWITCH MODIFICATION FOR TS1000.

### ORIGINAL CIRCUIT



### MODIFIED CIRCUIT.





## T/S1000 TURBO

The whole idea of experimenting with a "Turbo Switch" came from reading the book "Explorer's Guide to the T/S1000" by Mike Lord. On page 58 of this book under the heading "Keyboard Scanning" he tells how the system variable MARGIN may be changed from 55 to 31 by taking pin 22 of the ULA chip HIGH or LOW. This is supposed to be of use to the computer manufacturer to enable the 1000 to be used in either the USA which uses 31 blank lines at the top and bottom of the screen, or in the UK which uses 55 blank lines. The book also states on page 53 under the heading "NMI Handler" that "When in the SLOW mode the ZX81 uses the time occupied by these blank lines to carry on with your program."

So I thought that if I increased the number of lines on my 1000, I might increase the speed of program execution. And it works well. I use direct video and have not tried it using the RF modulator, but if you use direct video I think you will have success from the modification.

To test the speed of program execution I use the following BASIC program:

```
10 FOR N = 1 TO 500
20 NEXT N
30 PRINT "FINISHED"
```

With pin 22 ~~LOW~~<sup>HIGH</sup>, the computer takes 20 seconds. With the pin ~~HIGH~~<sup>LOW</sup>, the program takes 28 seconds. This is a considerable increase in speed. One might ask "Why have a TURBO Switch?". Well, when I use my WORD\* program at the "Turbo" speed the cursor blinks at about twice the normal rate and does not seem to miss keys as it did in the past, and when playing games I use the slower speed so that I can get a higher score!.

When using the higher speed I find the monitor screen is filled with lines from top to bottom, when using the slow speed I find a blank screen at the top and bottom 1/2 inch of the screen. I can switch from "TURBO" to normal at any time without any crashes.

Lastly, how is the modification carried out?. You have to take the T/S1000 circuit board out of it's case and locate resistor R30 which is located between the ULA chip and the regulator heat sink. It should have the colors Brown Black Brown.

Using a soldering iron, lift the left hand end of the resistor clear from the circuit board hole. Also locate resistor R38 which is four resistors down from R30, and solder one end of some two core cable to the left hand end of R38, which should be a 5V rail. To the raised left hand end of R30, solder one end of a 1K 1/4W resistor. Bend the resistor upwards and solder the other end to the right hand end of R34, which is a 0V rail. To the junction of R30 and the added 1K resistor solder the other core of the two core cable. To the other end of the cable solder a switch of the single throw single pole type.

That completes the circuit board modification. Try connecting a multi meter at the solder connection between R30 and the 1K resistor, and ground. When the 1000 is powered up, the "TURBO" switch should change the voltage from nearly 0Volts to nearly 5Volts, and if you have your monitor connected you should see the screen flicker.

The switch should be mounted somewhere convenient, accessible from outside the T/S1000. I have my T/S1000 mounted inside a steel chassis and so I mounted the "TURBO" switch on the front panel with the words "TURBO" and "NORMAL" along side the switch. Try entering and running the program that I LISTed earlier and see the difference the switch makes. ENJOY.

A problem common to QL owners is one of overheating...their machines, that is. Harvey T. sends along a reprint from QUANTA containing a fix for this problem.

#### A CURE FOR OVERHEATING

I see that there are still people with overheating problems (from the contents of the August Quanta). I would like to address this problem and hopefully PUT IT TO REST!

First, overheating is a symptom of the problem and not the problem. The QL uses a 1 amp 7805 voltage regulator. Everyone knows that this device gets very hot. With the lid open, you just can't touch the chip without burning your finger. However, you can touch the edge of the rather large heatsink. Hmmm, it's cold isn't it (relatively speaking)?

The 7805 chip requires bypass capacitance on the input (9 Volt side) AT the regulator and not some distance away (as the QL and ZX81 have). The 7805 has built in thermal protection so that if it gets too hot it will shut off. A locked up QL is not due to overheating. A QL with a black screen is an overheating problem.

If you check the specs for the 7805, you will see that its power output must be derated as the temperature of the part goes up.

Now let's discuss the real problem.

With improper bypassing and when the QL warms up, any electrostatic discharge into the air (from the monitor or walk by) can cause the 7805 to deregulate or oscillate. This surge enters by way of the power cable. Solution? Add a 0.1 microfarad capacitor (type 104, 16 working volts or greater) from the input to ground (right side to center pin when installed). Solder it right to the 7805 pins. Don't use a large capacitor to level the voltage on the input or you may blow your Microdrives (learned from experience). You might also consider routing your power cable away from your monitor and your feet.

It is interesting that the heat sink doesn't get very hot on the edges. Well it looks like a job for heatsink compound. Use a lot of it and don't forget to put some under the 7805. Don't skimp like Sinclair did. Now you'll find that the whole heatsink gets hot.

Better yet, add another 7805 to the heatsink. Cut the leads off about half way and screw it down on top of the first 7805, but point it the other way. Solder jumper wires criss cross back to the first 7805 and tie the two middle pins together. Put a flat washer under the new 7805 to take up the slack and fill it in with heat sink compound. You may have to bend up the regulator on the HDV to be sure that it doesn't contact the added 7805.

Consider also adding a bypass diode from 5 volts to 9 volts (banded end towards the 9 volt pin) on one of the regulators to prevent the 5 volts from ever rising above the 9 volt line.

I would suspect that someone with a regulator oscillation problem (previously referred to as overheating) would have other symptoms crop up, such as, blown ROMs and such. ROMs are 5800 times more likely to blow than a 74LS00, which has an estimated life of 1000 years (from reliability studies). I wonder how many QLs went back to the shop with blown ROMs within three months of purchase? I'll wager that quite a few did. ROMs simply cannot take any oscillation on the power grid.

One last point. Now that we are dissipating heat more efficiently, the case will get considerably warmer over the heatsink. I have also used large stick on feet to prop up the back of the QL so that it is about 1 1/4" from the table. I added small feet in from to allow air to pass under the front of the QL. This will allow air to flow in under the Microdrives and out the back more efficiently. (I find the increased angle easier for typing too.)

Consider this a power upgrade. You now have 2 AMPS of current. You can also get rid of all those silly noisy fans that you have blowing dust all over the inside of your QL.

## ZX-81/TS1000

### Column

by Frederic Stern

#### Whats New?

We have a new newsletter which supports our computer. Andre Baune in Quebec, Can. is publishing ZX-91 for the ZX-81/TS1000 computers. His first issue published is a 2 page "flyer type" letter which told about the editors background in Sinclair computing, and also contained excellent graphics for which printouts are available. The newsletter is composed with a TS1000, 16K rampack and a TS-2040 printer. Andre promises that future issues will be 12 pages long, with more updated information for the ZX-81 user. (NOTE: page is a 40 column 48 line page placed side by side 3 pages to each side of a standard 8.5 x 11 sheet of paper) To get onto Andre's mailing list, send him a letter

TO: Andre Baune  
304 Scott,  
Chateauguay, Quebec  
Canada J6J 4H5

#### OLD NEWS:

In our column, I said that if you were interested in obtaining a VHF modulator send me a letter, saying how many you wanted and if I received enough enquiries a bulk purchase would be made.

To date I have 3 readers requiring 6 modulators. I need a minimum of 10 modulators to make my bulk order. If you are interested send a card or letter to me in care of L. I. S. T.

#### Software:

LIST publishes a program tape for the ZX-81/TS 1000. This tape has a large number of programs on it.

The tape is on a quality C-60 cassette, and sells for \$5.00 through LIST.

By the way, this tape is from a remaster of the first program tape published by LIST in 1985.

#### From P2

#### A FINAL WORD

\*\*\*\*\*  
MY NAME IS FRED STERN AND I AM THE EDITOR OF THIS EDITION OF LISTING.

I HAVE RETURNED AS EDITOR OF THIS ISSUE FOR A SIMPLE REASON. AFTER THE LAST MEETING, A FEW FELLOW MEMBERS AND MYSELF WERE IN HARVEYS KITCHEN. THESE MEMBERS EXPLAINED TO ME HOW IMPORTANT IT WAS FOR ME TO TAKE OVER IN ALVINS ABSENCES. I AGREED WITH THEM WHOLE HEARTEDLY AT WHICH TIME THEY UNTIED MY LIMBS FROM THE TABLE LEGS AND QUENCHED THE RED HOT POKERS THEY HELD IN THERE HANDS.

THANKS TO MICHAEL STERN AND TOM SKAPINSKI FOR THERE MOST VALUED ASSISTANCE IN GETTING OUT THIS NEWSLETTER.

SEE YOU ALL AT THE NEXT MEETING.

#### QL FIXES

Printed With  
Permission Of  
Alex Burr, QZX  
Feb 16, 1992

Bob Curnutt

The article that starts on the next page was transcribed and edited a bit by WA6DLL. He got it from the CATS newsletter of May 1989. The Capital Area Timex Sinclair users Group has consistently published one of the best newsletters left.

The tendencies for the QL to lock up which is mentioned in the article have puzzled many people including the makers of the machine.

The technical manual for the QL admits that the factory did not know what caused the problem. Here is a reasoned solution, based on much investigation. Many people have had success by adding the capacitors suggested in the following article gives the details.

Continued on P9 QZX Dec 1991



(Reprinted from CATS Newsletter May 1989)

[CATS = Capitol Area Timex Sinclair user group]

SOME NOTES ON THE QL FIXES by Bob Curnutt (with reviews and side comments by Tom Bent)

the first definitive article on the "Tom Bent" mods

We have all gotten QL computers at salvage prices, entirely due to the rush into production 5 years ago. The majority of users seem to be able to adapt to the "system lockup" syndrome, but it has alienated thousands.

As far as we know, we at the CATS user group are blessed with the only QL expert this side of the Atlantic, Tom Bent.

Tom has run to ground the major faults, all traceable to hasty design. The last '88 issue of Quantum Levels details the simplest "cure" for the voltage regulator overloading: the 20 ohm shunt. (The first issue of Quantum Levels suggested on doubling up on the original regulator.) BOTH are worthwhile starting fixes. I'd like to outline the others he has shared with our group at the "hardware sessions" which precede our regular monthly meetings.

#### **\*\* HELP IS AT HAND**

By the time you get this, the latest "Quantum Levels" should be available, and should have drawings and much more detail; this is written for those who don't have any other source, and may be about ready to scrap their crashing QL.

The following assumes only that you have done some soldering on P.C. boards, and do NOT have a circuit diagram or "Service Manual". The QL board is not really as delicate as you might assume; it is similar in quality to the ZX-81 and 2068. The following descriptions refer to the labels on the board, near each component, small but visible. All directions are referenced from the user's normal view, as though you had a transparent keyboard. I hope you can do the following, and still have your machine work a little; then you can send it to Tom Bent and he MAY be able to do the final testing (outlined below) and return it with minimum effort. (transcriber's note: I doubt that Tom is interested as 1992 is here! WA6DLI).

First the "cold" fixes, preferably on a machine which still runs up to the "F1/F2 Menu". Remove the top cover, saving screws in a safe place (label the two nearest the right bottom foot MDV1 and MDV2 and leave them in place).

For this article, the "motherboard" need never be taken out of the case. If the power connector needs re-soldering, or the extra wire is added to supplement the sometimes anemic 5 volt power traces, then the board has to come out. I avoid doing this only because of the difficulty of inserting the microdrive ribbon cables where you really need good, thin, needle-nose pliers.

Use fat-nose pliers on the upper "ear" of the power receptacle while plugging in the connector. (I've had to replace mine, since they eventually break off when bent back and forth too many

times. The pins come out though the rear, incidentally, and are not all that hard to replace. I use standard "header" pins, 25 mils square, 5/8th -inch long; sure, the originals are 25x40, but use gold plated!)

After powering up, check the DC voltage with a calibrated meter at the leftmost pin of the regulator; 5 to 5.2 volts is nice. A quick check at the jumper wire to the 68008 may show 1/10th volt less. This may be due to RF on the line. Less than 4.9 volts may mean a defective regulator. Make sure there is a 0.1 mfd capacitor attached between the center pin and the right hand pin; the factory provided a 0.47 mfd electrolytic way down on the board, but it's several inches away. A really high gain regulator may oscillate with this much inductance in its input, which could cause it to shut down. (Your ZX-81/1000 could use the same treatment).

#### **\*\* SUPPORT YOUR SAGGING 68008'S POWER**

The insulated jumper between IC-18 (the 68008) and the foil near C5 (between J1 and J2) is at the END of the 5 volt trace, a foot away from the regulator. The "223" ceramic capacitor added between pin 13 (+5v) and pin 35 (gnd) needs help. A 10 microfarad 10 (or more) volt tantalum type capacitor should be added in parallel; note that the plus(+) side should go to pin 13. Use a cap with less than 1/4-inch diameter or the keyboard may press on it.

The straggly jumper can be replaced with solid #20 wire with a ferrite bead or two slipped on for further isolation from noise. All holes in the board are big enough for #20 wire (0.032" dia.), but with solder in them they sometimes seem closed up, even when hot, so you might want to use #22 wire.

Note at the lower end of J1, pins 1-A/B are connected to a wide trace that should stop beyond DC-17; the later boards were made with a gap; if connected cut yours here. (See later re:8049). This is part of the ground which promoted a bad "ground loop" condition, the MAIN problem with the QL.

Re-solder the two upper solid wires (#30) from the 'spider board' where they're often poorly soldered to the board. If the 'spider board' feels the least bit warm in use, connect pins 1, 3, and 5 to pin 14. This will tie the three unused gates "high" as is proper TTL practice. (This is a hex inverter, half unused, CMOS at that!) Also connect a 0.001 mfd cap between pin 7 (gnd) and pin 14, to short noise to ground. CMOS chips are supposed to run cool.

While you're near the 8301 (IC-22), solder another 0.01 mfd (or "103" ceramic) capacitor between pin 15 (+5v) and pin 6 (the only ground for the whole chip). This is on the common side with the 68008. Next, connect a 0.001 mfd cap between the same pin 6 and the wire across the 68008, which connects its pin 15 (gnd) to pin 35 (ground on the side next to the 8301). This provides more shunting of 'differential' noise between ground levels to them.

The 8049 is the 40 pin chip located at the lower right hand corner of the board, near MDV1\_. It is the Intelligent Peripheral

Controller, and needs two capacitors, like the 68008. A 10 mfd, 10 V.(or more) tantalum needs to be connected between pins 20 and 40 which are diagonally opposite; connect the + lead to pin 40, (closest to the 5 volt regulator); also connect a 0.1 mfd ceramic across this, fully bypassing this trouble spot. At this point, note if the trace between 11 pin ribbon connector and pin 1 of the 8049 has been "factory" cut; most have, and it should be done. (I'm typing on #1310, which has none of the 'bandaids' yet has never locked up. It now has all the "fixes" described here and MAYBE never will.) I believe the intermittency problem is due to small individual faults spread about though the board's population; find and replace the faults and you will get a well behaved QL.

**\*\* NOW FOR THE HARD PART**

(Transcribers note: All the discussion about deciding on the proper value by measurement is made moot by Tom Bent's insert to just use 220-270 picofarad for all machines!)

There's one important above board fix left; it is one of the easiest to do, but most difficult to determine EXACTLY what to do. The big hitch is that inspection of the data lines from the 8301 (DB30 to DB7) requires a 300 MHz bandwidth oscilloscope as the rise and fall times are near one nanosecond. These data lines mainly carry video signals, so some experience with setting the trigger levels is needed. You're looking for a 3 to 4 volt negative slope signal with a nanosecond fall time. The problem arises at the bottom end, where a volt or so of 'overshoot' is DESIRABLE; 1.5 v. or more could mean trouble, 2 or 3 volts means the 8301 should be destroyed already! The excess overshoot is due to the sloppy ground returns, with the traces feeding the RAM chips at the far right from the 8301 (IC-8, IC-14, and IC-15), putting most of the noise on the rest of the "bus".

Tom Bent's fix is very simple; attach PROPER sized capacitors between each affected RAM chip's pin 14 and pin 8 (+5v.). This slows down the falling signal without overly slowing the original rise to +5 volts. Too large a capacity doesn't crash the machine immediately, but the fall time can become so long as to make the "fall" a long ramp; don't remove all overshoot! It's a sign the system is running at maximum speed.

A few specifics: DB0 is associated with 8301 pin 14, DB1 with pin 16, DB2 with pin 19, DB3 with pin 21, DB4 with pin 23; these have fairly well matched lines to ground and are the ones to compare to lines 5, 6, 7. DB5 is on pin 25, DB6 is on pin 26, DB7 is on pin 29. DB6 has the worst matched line and can be 2 volts when the first three are 0.7 volts. It takes some experience to determine how much capacitance to add, typically 50 to 390 picofarads in proportion to excess overshoot. (I recommend 220 to 270 for all machines-TB). Where to put them? To correct DB4, IC-13 (pins 8 to 14); Put little caps on pins 8 to 14 as follows: IC-13 for DB5, IC-15 for DB6, IC-8 or IC-16 for DB7.

(Transcriber's Note: The rest of the article is omitted, as it deals with borrowing the high tech scopes etc. and how to use them. This article is reprinted mainly as a convenient source for easily made fixes by adding the caps and other components. At the end Tom used a single size for all the fixes that were previously tailored by measurement..BobH WA6DLI)

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